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Lime juice and lime oil production and markets



Tropical Products Institute Report

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Summary

Lime juice and lime oil are obtained from the fruit of *Citrus aurentifolia* Swingle which has two distinct groups, the acid limes and the sweet limes, but commercial production to-day of lime juice and lime oil comes from the acid varieties of the fruit, two of which are the most important: one is the Mexican or West Indian or Key variety, the other is the Tahitian, Persian or seedless lime. This report examines the limes industry in the main areas of commercial production, namely, the Caribbean, Mexico, the United States and Ghana; reference is also made to developments in the Gambia and Tanzania. Lime juice is a beverage whereas oil of lime is used in perfumes, toilet water, cosmetics, and soaps and as a flavouring in food products, confectionery and beverages.

Dominica

Although production of limes in Dominica is small compared with that of many other producers, the crop is of economic importance to the island and, in 1963, lime juice and oil of lime together accounted for almost 14 per cent of Dominican domestic exports.

The bulk of the lime crop is disposed of to local processors of which there are eight on the island but only two undertake the full treatment of settling, clarification and casking. These two are L. Rose & Co. Ltd., and Messrs. A.C. Shillingford & Co. Rose's operate the only concentration plant on the island.

Dominica's total juice settling capacity is 250,000 gallons of which L. Rose & Co. Ltd. own 130,000 gallons capacity and Shillingford's 46,000.

Oil from Dominica is obtained in two ways: écuelling and distillation. Only a small amount is produced by the former method and yields are low, some 2½ to 3 ozs. of oil per 160 lb. barrel of fruit. The distillation method is the one mostly used and oil obtained in this way from picked fresh limes can give an average of 8 ozs. of oil per barrel compared with the 5½ to 6 ozs. obtained from the pulp of fallen ripe limes after juice extraction and racking.

The largest markets for lime juice are the United Kingdom, USA and Canada. The United Kingdom is the principal market for Dominican lime oil.

Jamaica

Although production of limes in Jamaica is greater than that in Dominica, its importance to the economy of the island is not so significant and the fruit is grown mainly as a pasture crop on grazing land or is interplanted between coconut trees.

Exports of lime juice and lime oil go almost entirely to the United Kingdom and both quantities exported and unit prices have shown a tendency to increase in recent years.

Grenada

Grenada is a small producer of lime juice and exports have tailed off considerably in recent years, and in 1963 hurricane damage badly affected the crop. Such lime juice as is exported goes mainly to the territories of Dominica and Trinidad.

Exports of lime oil, on the other hand, increased in the three years up to 1965, probably because higher world prices made it worthwhile for the Grenadian growers to process the limes.

Guyana

The bulk of Guyana's lime juice exports are of the settled type and shipments are made mainly to the United Kingdom market. Most of the lime oil produced is distilled and is produced for export, mainly to the United Kingdom. Some écuelled oil is produced which is used almost exclusively in a local product; any écuelled oil produced in excess of local demand is exported.

Trinidad and Tobago

The limes are grown among other crops, mainly by small-holders who look to the fruit to provide them with another cash crop. Thus the economic importance of limes in these islands, compared with other citrus, is relatively small. Prices paid to growers have varied considerably and, sometimes, have been so low as to make it uneconomical for growers to collect the fruit. However, the present outlook is more encouraging and the local growers have been planting additional trees, which will mean some additional fruit in a few years time.

The only processing plant crushes an average of 3 million pounds of fruit annually with an approximate yield of 93,000 gallons of settled juice and 10,000 lbs. of distilled oil. No concentrated juice is produced.

The United Kingdom is the best market for the juice, followed by the USA and Canada.

An insignificant amount of écuelled oil is exported, but the bulk of sales is of distilled oil, Canada and the United Kingdom being usually the larger markets, although Bermuda has also appeared as a large but irregular buyer.

Montserrat, St. Lucia, St. Vincent

Montserrat exports juice to the United Kingdom and Canada but does not export oil. The small production of juice on St. Lucia has declined and no export trade is recorded after 1961. St. Vincent has exported insignificant quantities of écuelled oil but there is the possible private development in the future of some 500 acres of land for lime production.

Haiti and Cuba

No lime juice appears to be produced in Haiti and most of the oil produced is probably exported to USA whose imports from Haiti have shown a tendency to increase. Cuba had a small but growing share of the lime oil market in the USA up to 1960 since when no statistics have been shown. In 1963, imports of oil from Cuba into the United Kingdom were recorded for the first time but there is insufficient information available to be able to assess what the future prospects for Cuban oil are likely to be.

Mexico

Lime plantings have increased in recent years and estimates are that 30,000 acres under limes in 1951 had risen to 31,000 acres by 1961 and could reach 50,000 acres by 1971. From 1951 to 1961, production of limes had remained fairly constant at about 68,000 tons a year.

The Mexican limes industry is regulated by the National Union of Lime Oil Producers, a quasi-Government organization. The Union regulates plantings, establishes quality specifications of both oil and juice and establishes a yearly quota of the quantity of lime oil that may be produced. The Union also claims to be active in developing new products, seeking new markets and developing new methods of sale of both juice and oil. Opponents of the Union claim that, because of its monopolistic position, it interferes with normal market processes. Most of Mexico's lime juice and lime oil is exported to the USA with the United Kingdom, France and Germany appearing as occasional buyers of juice and the United Kingdom and Canada have a small performance as buyers of oil.

Ghana

The Ghanaian industry has been set up by L. Rose & Co. Ltd. under Government auspices.

At present some 4,500 acres are planted with about 1 million plants and the average yield from mature, clean trees is about 165 lb. per tree annually.

A processing factory is in operation and fruit is collected up to a 15 mile radius from the factory.

Exports of lime juice have shown a generally increasing trend since 1957 and consignments are made only to the United Kingdom. No export figures of lime oil are available but, as with juice, most of it is probably shipped to the United Kingdom.

The Gambia

The industry in the Gambia is still only in the pilot stage and the Tropical Products Institute is closely concerned with its development. At present 15 acres are planted with 'Key' limes but there is, additionally, a plentiful supply of limes elsewhere in the Gambia.

Tanzania

A nucleus estate is being developed and smallholders are being encouraged to plant lime trees. A simple crushing mill has been installed and an ultimate production of 1 million gallons of juice a year was envisaged. It is rumoured that Tanzania has now embarked on a heavy planting programme which, if successful, may lead to a surplus of lime products in world markets.

United States of America

Nearly all US limes are grown in Florida and three-quarters of them are disposed of as fresh fruit. The fruit is a minor crop in terms of the US production of citrus fruit, accounting for some 0.2 per cent of the total.

For various reasons the lime industry has failed to show substantial growth and demand for lime juice in the USA is satisfied mainly from Mexico and from the

United Kingdom. However, total sales both to the fresh market and to the processors have increased steadily over the past ten years and so have imports. Thus it appears that, although there is a growing awareness of lime products in the United States, the imported juices are holding their own.

Florida lime-growers have, in the past, had little interest in converting their lime fruit into juice and oil and Florida lime oil has not been regarded as a commercial article. In the past ten or twenty years, however, increases in production and processing have led to the production of lime oil as a by-product of the extraction of the juice. Modern processes are employed whereby the oil can be separated without contact of juice and oil and it is claimed that this processing produces a more natural lime flavour. Nevertheless, the trade has become accustomed to the flavour of the old-fashioned distilled oil and, so far, seems to prefer it to any other. Consequently, there are high imports of oil entering the USA from Mexico, Haiti, Dominican Republic, Jamaica and Trinidad.

Prices in the UK

Up to some twelve months ago, there was a shortage of lime juice and prices rose to almost double the level of, say, four years ago, to 10s.6d. to 11s. per gallon c.i.f. for settled juice (maximum 2% pulp). At these prices lime juice was in danger of being priced out of the market and a more acceptable price to the merchants would be 8s. to 8s.3d. per gallon c.i.f. In fact, the general situation of supplies has changed quite dramatically in recent months and there now appears to be an oversupply position in the UK that has had the effect of lowering prices to about 8s. a gallon. This downward trend could continue if the coming season produces average crops.

Lime oil has also been in short supply and prices have risen to 60s. to 70s. per lb. c.i.f. compared with lemon oil at about 40s. to 45s. per lb. and sweet orange oil at about 5s. per lb. At these differentials there is a danger that the major users of lime oil will cease to include it in their formulations in favour of the cheaper flavouring oils.

The UK customs duty on lime juice imported from all countries except Commonwealth countries is 18 per cent *ad valorem* if there is more than 20 per cent sweetening matter added and 15 per cent *ad valorem* if less than 20 per cent sweetening matter is added. Juice of all kinds is admitted free from Commonwealth countries. Lime oil is duty free from EFTA and Commonwealth sources but attracts a duty of 25% *ad valorem* from all other countries.

There are no quantitative restrictions on imports of juice and oil into the UK but imports may be inspected at ports to ensure that they are fit for human consumption.

UK Market and Prospects

The United Kingdom market for citrus juices other than orange juice, grapefruit juice and mixtures of these grew at the rate of 3.8 per cent per annum in the period 1959 to 1965. The specific growth of lime juice demand cannot be assessed over this period but current demand is estimated at between 1¼ million and 2 million gallons, most of which comes from Commonwealth countries, particularly Ghana and the West Indies.

Jamaica, Ghana and the Windward Islands group are the principal suppliers of lime oil to the United Kingdom but both the USA and Mexico are also prominent suppliers.

The past few years have been a period in which considerably more interest has been shown by the public in lime juice than ever before. This interest has been stimulated by the sales efforts of L. Rose & Co. Ltd. but public taste may equally well alter in favour of some juice other than lime, especially if the price becomes too high. Thus the present level of demand may not be maintained.

About 95 per cent of the lime oil imported into the UK is used as a flavouring for food and drinks and the remainder is used in cosmetics, especially men's toiletries.

Although the prospect for lime products for the next few years appears to be one of limited sustained growth there are already a number of producing countries and newcomers will need to bear in mind the fact that, all things being equal, the supply of both juice and oil is sufficient to meet all demands. In these circumstances, and in view of the fact that it takes 8 to 10 years for lime trees to reach full bearing stage, development of new plantations or large capital investment in processing plant should be taken only after exhaustive enquiries have been satisfied as to the future of the market and after cognisance has been taken of the numbers of existing producers.

Western European Market and Prospects

There are reasons for believing that Continental Western Europe may take increasing quantities of lime juice during the next few years, although it is not possible to support this statement with any statistical data. The EEC countries will be difficult to break into because most will not permit the entry of juice preserved by SO₂ and this effectively excludes lime juice exported by L. Rose & Co. Ltd. The Scandinavian countries, especially Sweden and Denmark, have shown an interest in lime juice and sales to Sweden are now established.

The World Picture for Lime Juice and Lime Oil

Estimates of the future production of lime juice indicate that in 1971 it may be in the region of 4 million gallons against an estimated demand of about 3 million gallons. In the case of lime oil, world production has been estimated at 550 metric tons (1,212,542 lb.) against recorded imports in 1966 into the major markets, the UK and the USA of 924,000 lb.

Lime juice and lime oil production and markets

INTRODUCTION

Lime juice and lime oil are obtained from the fruit of *Citrus aurentifolia* Swingle which has two distinct groups, the acid limes and the sweet limes. Sweet limes grow wild and semi-wild in parts of South and Central America where the fruit has local appeal for its somewhat orange-like flavour, and oil from the peel of the sweet lime was marketed in the USA as a substitute for Italian Bergamot oil during the years of World War II when the source of supply of Bergamot oil was cut off. Subsequently, supplies of the Bergamot oil became available, and since the juice of the sweet lime is too insipid for wide usage the sweet lime lost all commercial importance.

Commercial production today of lime juice and lime oil therefore comes from the acid varieties of lime fruit, two varieties of which are the most important: one is the Mexican, or West Indian or Key variety, the other is the Tahitian, Persian or seedless lime. This report examines the limes industry in the main areas of commercial production, namely, the Caribbean, Mexico, the United States and Ghana. Reference is also made to developments in the Gambia and Tanzania. The report considers the market prospects for the juice and oil made from the acid varieties of limes only.

Lime juice was used medicinally – as an anti-scorbutic – long before it was regarded as a beverage. Lime oil is used extensively as a flavouring in food products, confectionery and beverages. It is also used in perfumes, toilet waters, cosmetics and soaps. Lime juice and oil is referred to by various descriptions. These descriptions, as used in this report, have the following meanings:-

Raw juice

This is the juice as it is obtained from the crushed limes before any further treatment is carried out. Raw juice contains pulpy matter from the expressed limes.

Settled or racked juice

When raw juice is allowed to settle in vats the heavier pulpy matter settles at the bottom and the fine, light pulp and oil rise to the surface. The intermediate layer of juice is left fairly clear; this is settled or racked juice.

Filtered juice

Settled or racked juice is not completely clear and can be filtered to remove particles of pulpy matter.

Clarified juice

A final filtering operation is carried out to obtain a clear, or clarified, juice. It is commonly carried out in the importing country but some producing areas export a clarified juice.

Concentrated juice

The water is removed from the juice, usually by the application of heat at reduced air pressure, until the desired degree of concentration is obtained.

Top juice with pulp

The fine light pulp with oil and juice that rises to the top of the settling vats.

Ecuelled oil

The écuelle consists of a shallow bowl of copper with a hollow central tube with which it forms a funnel. The bowl is equipped with large brass nails with blunt ends, across which the fruit is rolled by hand until the entire surface of the fruit has yielded its oil which dribbles down the central tube into a container.

Distilled oil

Following the racking process, the top juice with pulp and oil and the lower layer of heavier pulpy matter are drawn off and run into stills. There are various methods of distillation, perhaps the most usual being by direct and indirect steam.

THE LIMES INDUSTRY IN DOMINICA

While the production of limes in Dominica is small compared with that of producers like Jamaica and Mexico, the crop is of great importance to the economy of the island and, in 1963 (the last year for which figures are available), raw lime juice and essential oil of lime together were the second largest export of Dominica, accounting for almost 14 per cent of her domestic exports. Even so, these figures show a decline from the previous year when exports of juice and oil combined were almost 20 per cent of domestic exports and the later figures recorded a reduction in value of nearly 44 per cent⁽¹⁾.

In the West Indies Census of Agriculture, 1961⁽²⁾, the area under limes is recorded as being 2,290 acres on compact plantations, of which more than two-thirds is grown on holdings of more than 50 acres and nearly 40 per cent is on holdings of over 500 acres. Further details are given in the following table:

Limes: Area and number of trees, by size of holding, in Dominica 1961

			SIZE GROUP (ACRES)							
Area in compact plantations:			0	1-	5-	10-	25-	50-	100-	200- 500+
TOTAL	Acres	2,290	-	208	74	139	99	177	176	576 841
Non-bearing		135	-	43	7	8	1	16	-	40 20
Bearing		2,155	-	165	67	131	98	161	176	536 821
Total trees on holdings:										
TOTAL:	Trees	286,324	2,372	41,825	16,983	30,858	10,839	19,190	18,433	59,071 86,753
Non-bearing		23,405	211	6,239	4,444	4,078	173	2,000	200	4,060 2,000
Bearing		262,919	2,161	35,586	12,539	26,780	10,666	17,190	18,233	55,011 84,753

Source: *Extract from Report on West Indies Census of Agriculture, 1961.*

There is a small local trade and a small export trade in fresh limes, mainly during the tourist season, December to April, but the bulk of the lime crop is disposed of to local processors. Limes for processing are not normally picked from the trees but are collected when they ripen and fall to the ground. The prices paid by the processors to growers have varied widely over the past few years according to the demand for juice and oil. At the time of writing, the price paid was WI \$5.80 per barrel of 160 lb. containing 1,200 to 1,500 limes. In addition, an allowance was made to cover transport of the limes, varying from 20¢ to 75¢ per barrel depending on the distance of the growing area from the factory.⁽³⁾

There are reported to be eight plants expressing lime juice on the island but only two of these undertake the full treatment of settling, clarification and casking: these are L. Rose & Co. Ltd., the island's largest processor and Messrs. A.C. Shillingford & Co. One firm exports pulpy juice and the others express the juice for sale to either Rose's or Shillingford's. Shillingford's do not sell concentrate juice because they consider that concentrated juice loses some flavour in export transit. Rose's operate a concentration plant which produces 4 gallons of 5 : 1 concentrate per hour, that is, 5 parts of single-strength juice produce 1 part of concentrated juice.

Dominica's total juice settling capacity is 250,000 gallons of which Rose's own 130,000 gallons capacity and Shillingford's 46,000 gallons. The vats are constructed of wood and the raw juice is allowed to settle in the vats for two or three weeks. This permits the heavier detritus to settle at the bottom and the fine, light pulp and oil to rise to the surface. The intermediary layer of juice will be relatively clear and can be drawn off and sold as 'settled' or 'racked' juice. The upper layer is sometimes exported as 'top juice with pulp' but normally is distilled locally to obtain the essential oil of lime.

Average yields from 1 ton of limes are 70/80 Imperial gallons of settled juice and 4 to 6 lbs. of oil. A yield of 75 per cent settled juice is expected from the raw juice. The settled juice used to be exported in once-used whisky barrels obtained from the USA but revised legislation in the USA permitting whisky distillers there to use the barrels more than once created a shortage for use in Dominica. However, this problem has now been resolved and the juice is being shipped in White Fir or Oak barrels of 40-42 gallons and is preserved by sulphur dioxide, usually in the proportions of 600 parts per million.

It is necessary to point out the fundamental difference in outlook that there has been between L. Rose & Co. Ltd., and the other processors. Rose's have been primarily concerned with the market for lime juice for sale through their

organisation as 'Rose's Lime Juice'. Juice surplus to their requirements is sold to other soft drink manufacturers. Lime oil has been of secondary significance. The problem of finding a market for juice has been, until recently, more formidable for the other processors and at some of the low price levels recorded in the past few years for lime oil, processing for oil without an assured market for juice has been unprofitable.⁽⁴⁾

Until recently, however, demand for juice and oil was outstripping supply and prices of both increased, as will be discussed in a later section of this report.

In Dominica, oil is obtained from the fruit in two ways. A small proportion is obtained by the old-fashioned method of "ecuellling". The ecuelle consists of a shallow bowl of copper with a hollow central tube with which it forms a funnel. The bowl is equipped with large brass nails with blunt ends, across which the fruit is rolled, by hand, until the entire surface of the fruit has yielded its oil which dribbles down the central tube into a container. The yield of oil depends on the condition of the fruit and on the skill of the operator but is usually very low and is, on average, 2½ to 3 ozs. of oil per 160-lb. barrel of fruit⁽⁵⁾. The distillation method is the one mostly used in obtaining oil. Following the racking process, the 'top juice with pulp and oil' and the lower layer are drawn off and run into stills. One hundred gallons of juice yield an average of 4-lb. of oil. If the limes have been ecuelled prior to crushing, the yield of distilled oil is of course lower. Fresh picked limes can give as much as an average of 8½ ozs. of oil per barrel of 160-lb. of fruit⁽⁵⁾ compared with the 5½ to 6 ozs. of oil obtained from the ripe fallen fruit which is the best for juice extraction. Thus the processor faces the dilemma of whether he should regard lime oil as a primary or as a secondary product and the decision can only be made in the context of the processors' outlets for both and their related prices.

Details of exports from Dominica of (a) settled and (b) other types of lime juice (top pulp, raw, sweetened and concentrated) are given in Tables 1 and 2 in the statistical appendix. The period covered by the statistics is 1957 to 1966. However, a breakdown of exports according to type of juice is not available for the years 1959, 1960 and 1961. Table II over summarizes exports of all types of lime juice. In the figures for the years 1962 to 1966 the quantities of concentrated juice exported are expressed in terms of their equivalent as settled juice.

Table II

Exports of lime juice of all types from Dominica, 1957-66

	thousand gallons
1957	449.1
1958	726.5
1959	721.1
1960	443.0
1961	89.0
1962	701.9
1963	473.0
1964	356.2
1965	527.3
1966	602.7

It will be seen that the annual exports have varied considerably during the period under review. The decline after 1959 may have been partly due to a policy

encouraged by the authorities of replacing old, uneconomic trees with new stock that would take some time to come to full-bearing. (It takes from 8 to 10 years for lime trees to reach full bearing). However, it is known that Rose's began to make concentrated lime juice in 1960 and this may additionally explain the very low export figure for 1961; the figure would be higher if the unknown element of concentrated juice were expressed in terms of its equivalent as settled juice. In 1962, exports of settled juice were low at 19,000 gallons but in that year there was a substantial export of 113,000 gallons of concentrated juice. In the following year, the island was affected by hurricane 'Edith' and exports declined of both settled and concentrated juice to 21,000 gallons and 85,000 gallons respectively. From 1964 there was a general upturn in exports of all types of juice. Settled lime juice sales were 153,000 gallons, concentrated 32,000 gallons and top pulp 27,000 gallons. These three constituted the main exports of juice but additionally some raw and sweetened juices were exported. The following year, 1965, showed an increase to 291,000 gallons of settled juice and an increase in the sale of top pulp was also registered, 104,000 gallons being disposed of. Concentrated sales fell slightly to 25,000 gallons. In 1966, sales of settled juice and top pulp declined to 178,000 gallons and 35,000 gallons respectively but sales of concentrated juice rose to 98,000 gallons.

The biggest market for Dominican lime-juice is the United Kingdom, a natural outcome of British influence in the Caribbean and the development of the interests in limes of L. Rose & Co. Ltd. Other markets are the United States and Canada.

Exports of lime oil from Dominica are given in Table 3 of the statistical Appendix. Exports consist mainly of distilled oil. Small quantities of ecuelled oil and oil in suspension in juice are exported from time to time, but the trade in these is insignificant. Exports can vary considerably from year to year: no trend is discernible. The UK is by far the principal market.

THE LIMES INDUSTRY IN OTHER CARIBBEAN AREAS

Jamaica

While the production of limes in Jamaica is relatively large compared with that in Dominica, its importance to the agricultural economy of the island is much less⁽⁴⁾.

The limes are grown mainly as a pasture crop on grazing land or are inter-planted between coconut trees. No reliable data is available as to total acreage under lime cultivation. In 1961⁽⁶⁾, there were eight factories in Jamaica processing and canning fruit products but since the details available concerning their activities do not include the processing of limes it must be presumed that this is generally a minor aspect of their operations. However, it is known that two firms control a lime juice capacity of 650,000 gallons and that these two firms are the principal producers in the island.

Exports of lime juice from Jamaica go almost entirely to the United Kingdom and trade with other countries is negligible. Details of the trade are given in Table 4 from which it will be seen that sales of juice have shown a tendency to increase in the period 1957 to 1965. The annual average volume of exports from 1958 to 1961 was 392,000 gallons. This rose to 502,000 gallons in the period 1962 to 1965, an increase of 28 per cent. The year 1965 was the peak year of the nine-year period from 1957, 619,000 gallons being exported, of which 598,000 gallons or nearly 97 per cent went to the United Kingdom. The unit price of lime juice has also shown a tendency to increase: in 1957 it was about sh. 5s. per gallon calculated on the basis of the f.o.b. price; in 1962, the peak year before the record year of 1965, it was again around sh. 5s. per gallon and, in the three years 1963, 1964 and 1965 the prices realized were in the region of

sh. 5s., 5s.4d. and 6s. per gallon respectively.

The pattern of exports from Jamaica of lime oil (Table 5) is similar to that of lime juice in that nearly all shipments are made to the United Kingdom. Annual average exports of oil between 1962 and 1965 were, at 56,000 lb. 12 per cent greater than the annual average of 50,000 lb. for years 1958 to 1961.

Average unit prices for oil have also shown a tendency to increase, from around sh. 35s. per lb. in 1957 to sh. 41s., sh. 43s.6d. and sh. 45s. per lb. in 1963, 1964 and 1965 respectively.

Grenada

Exports of lime juice and lime oil from Grenada are given in Tables 6 and 7. Since 1962, exports of lime juice have tailed off considerably, and totalled only 3,000 gallons in 1965 compared with 12,000 gallons in 1962 and the peak of 76,000 gallons in 1960. In 1963, the island was struck by hurricane 'Edith' and considerable damage was caused to crops. The lime juice is sold to Dominica and Trinidad.

Although Grenada is still a comparatively small-scale producer of lime oil, her exports (shown in Table 7) have expanded considerably in recent years, undoubtedly in response to the higher prices that lime oil has been commanding on the world market. Thus in the period 1957 to 1962 the highest recorded exports of lime oil were 1,700 lbs. in 1958, whereas in the three years 1963 to 1965 (the latest year for which statistics are available) exports averaged 3,600 lbs. per annum.

The UK is usually the main market for lime oil from Grenada, but, in 1965, 3,600 lbs. went to various unspecified countries, the balance of 2,000 lbs. being sold to the UK.

Guyana

Guyana's lime juice exports, which consist mainly of settled juice, have varied considerably between 1957 and 1964, the years covered in Table 8. From a peak in 1957 of 17,000 gallons exported, shipments fell away, except for a slight recovery in 1959, to only 100 gallons in 1962. The decline in shipments is attributed to low world prices, which made collecting and processing the limes uneconomic. In 1963, several of the West Indian islands suffered damage from the hurricanes 'Flora' and 'Edith' with the result that supplies of West Indian lime juice and oil became restricted and prices began to rise. In 1964, exports from Guyana rose significantly to 11,000 gallons, the highest level reached since 1959 (Guyana did not publish trade figures in 1963). The principal market is the United Kingdom. Exports of lime oil were small between 1957 and 1962 and only once, in 1958, did they exceed 1,000 lbs. In 1964, however, exports reached a record 7,000 lb., of which 5,600 lb. was distilled oil and 1,400 lb. ecuelled oil. Exports of lime oil are given in Table 9. The UK is by far the largest market.

In Guyana all the distilled oil produced is exported.⁽⁷⁾ The ecuelled oil, on the other hand, is used almost exclusively in the manufacture of a locally-made product, 'Limacol', a toilet water. The manufacturer of this product also imports a certain quantity of the ecuelled variety, partly for blending purposes but also as a safeguard against possible crop failure. Any ecuelled oil produced in excess of the local demand is exported. Occasionally, a small quantity of distilled lime oil is imported as a flavouring for locally manufactured confectionery. Imports of lime oil into Guyana are shown in Table 10.

Trinidad and Tobago

A survey of the citrus industry made in 1956 indicated that citrus occupied nearly 10,000 acres, but it is impossible to say what proportion of this is devoted to lime cultivation. There are no lime groves as such, the fruit being grown among other crops, mainly by small-holders, as a cash crop.

Production of limes has been adversely affected by loss of trees from disease. Some effort has been made to replace losses by replanting 'budded' limes on disease-resistant root-stocks. However, the economic importance of limes in these islands, compared with other types of citrus, is relatively small. Prices to growers have varied considerably and at times have been so low as to make it uneconomical for the growers to collect their fruit.⁽⁸⁾ However, the present outlook is more encouraging and the local growers have been planting additional trees which will mean some additional fruit in two to four years time.⁽⁹⁾

There is at present only one processing plant on the islands, operated by Trinidad Lime Products Ltd. The average yearly quantity crushed is 3 million pounds of fruit, with an approximate yield of 93,000 gallons of settled juice and 10,000 lbs. of distilled oil. No concentrated juice is produced.⁽⁹⁾

Exports of lime juice from Trinidad and Tobago are shown in Table 11. It will be seen that exports vary considerably from year to year.

From 1957 to 1959 exports of clarified and filtered juice, which constitutes the bulk of the export total, declined from 61,000 gallons to 52,000 gallons but there was a sharp, nearly four-fold, increase in 1960 to 201,000 gallons. The reason for the increase was that the United Kingdom purchased from these territories considerably more juice than previously. In 1961, exports dropped back to a mere 26,000 gallons but climbed again in 1962 to 91,000 gallons. In 1963 and 1964 exports declined slightly to 75,000 gallons and 84,000 gallons and fell away even further in 1965 to only 47,000 gallons. After the United Kingdom, the USA and Canada are Trinidad's best markets.

Exports of lime oil are given in Table 12. Like the lime juice exports, exports of oil show considerable annual variation. However, on balance exports tended to increase between 1957 and 1962 and in the latter year reached 22,000 lb. of which 15,000 lb. were purchased by Bermuda. Bermuda is, however, an erratic purchaser of lime oil. In 1963 she did not appear in the market and Trinidad's exports of lime oil declined sharply, to 5,000 lbs. In 1964, they increased again, to no less than 34,000 lbs., of which Bermuda purchased 29,000 lbs., but in the following year when Bermuda purchased only 2,700 lbs., Trinidad's exports declined sharply once more to only 8,800 lbs. The likelihood is that Bermuda's purchases are of a speculative nature. The figures certainly suggest that she cannot be relied upon to provide an outlet for Trinidad's exports, but at the same time they show that when markets are available Trinidad can substantially increase her supplies of lime oil. Apart from Bermuda, the UK and Canada are Trinidad's main customers. During the period under review the purchases of both countries have shown similar trends, namely, declining in the earlier years and showing an upward trend in more recent years.

The bulk of Trinidad's exports are in the form of distilled oil although occasionally very small amounts of ecuelled oil are exported.

Montserrat, St. Lucia, St. Vincent

Figures for exports of raw lime juice from Montserrat are given in Table 13: in 1964 they were 14,000 lb., the highest level since 1958. The year 1963-64 saw marked progress in the general economic development of Montserrat⁽¹⁰⁾ but there is, at present, insufficient information to show whether this progress will be reflected in the limes industry. The United Kingdom and Canada, with whom Montserrat has commercial links, are the two best markets for lime juice and it is

understood that a Canadian company in Montserrat buys limes for sale of raw juice to Dominica for further processing there. No oil is exported from the island.

The small production of lime juice on St. Lucia has declined and no export trade is recorded after 1961. The figures for 1957 to 1961 are given in Table 14 and show that exports of lime juice during those years did not exceed 5,500 gallons per annum.

St. Vincent exports excellent lime oil but the amounts involved (see Table 15) are very small and in some years no shipments are made. The UK is the only customer. There is the possibility of private development of lime growing on St. Vincent. Tentative plans are to propagate limes by building up 30,000 lime trees for the planting eventually of about 500 acres and, by 1971, some 3,000 tons of limes a year might be expected.

Haiti and Cuba

There are no recent figures of Haitian production of lime oil. Lime juice does not appear to be produced there. Most of the oil is probably exported to the United States although, in 1965, nearly 4,500 lb. was shipped to Australia according to the Australian trade returns, the first and only time any trade had been recorded with this country in the period 1961 to 1966 inclusive. The United States import figures are fairly substantial and have shown a tendency to increase. In the period 1957 to 1961 the annual average volume of imports into the USA from Haiti was some 42,000 lb. whereas from 1962 to 1966 the annual average rose to 87,000 lb.

Cuba had a small, but growing, share of the lime oil market in the United States up to 1960, but since then she is not shown as a supplier in the United States statistics. In 1963 the UK recorded imports from Cuba for the first time for several years. These amounted to 14,000 lb. and rose to 18,000 lb. in 1964. However, there was a fall-off in 1965 and 1966 when preliminary figures showed imports to be only 4,000 lb. and 6,000 lb. respectively. Cuba does not appear to export lime juice.

THE LIMES INDUSTRY IN MEXICO

The past fifteen years have been years of rapid development in Mexico, and as the infrastructure of the economy has improved the citrus industry has expanded considerably.

Orange plantings have shown the greatest development, but lime plantings have also increased. In 1951, it was estimated that there were 30,000 acres under limes. By 1961 the acreage had risen only to 31,000. However, it is now estimated that lime plantings could reach 50,000 acres in 1971.⁽¹¹⁾

From 1951 to 1961, the last year for which production figures are available, production of limes had remained fairly constant at about 2 million boxes (each of 76-lb.), that is, almost 68,000 tons per year.

The main production area for limes is in the state of Colima, which accounts for over 40 per cent of the Mexican output. Areas of smaller production are the states of Michoacan, Vera Cruz and Tamaulipas and, it is believed, considerable interest is being shown in plantations in the north of the country. The bulk of the production is disposed of as fresh fruit, but between 1951 and 1961 Mexico nearly doubled its processing capacity to about 600 to 800 short tons a day. However, only a small part of the capacity was in fact used to process limes because of the lack of markets for juice and essential oil. The increased plantings, combined with the lack of markets, resulted in a glut of lime juice and oil. This

situation was further complicated by the fact that part of the processing was done by plants controlled by semi-government agencies which, by law, were compelled to accept quantities of fruit and, therefore, to act as surplus disposal agencies. This situation prompted the Government to establish the Union Nacional de Productores de Aceite de Limon (National Union of Lime Oil Producers), a quasi-Government organization formed to regulate the Mexican limes industry. Its Board of Directors includes representatives of the Ministries of Agriculture, Finance, Industry and Commerce, and the Bank of Mexico.

The Union regulates plantings, establishes quality specifications for lime oil and lime juice, and issues all export permits for lime oil, which has to conform to the Union's quality Standards.

The Union establishes a yearly quota for the quantity of lime oil, both distilled and cold-pressed*, that may be produced. Each year the market situation is assessed and an estimate made of the quantity of oil it will be possible to use in the domestic market and to export. Based on this estimate, quotas are given to each lime oil producer. The annual total production quotas are equal to the estimated quantity required in the market, plus 10 per cent.

The Union also claims to be active in developing new products, seeking new markets and developing new methods of sale of both juice and oil.

The Union has been a controversial organisation mainly because private processors object to its monopolistic position and claim that it interferes with normal market processes. The Union, on the other hand, claims that it has improved the quality of lime products and brought some stability to the market. Despite the opposition, it is understood that the Union is still operating as a regulatory agency.

The exports of lime juices from Mexico shown in Table 16 illustrate the fluctuating nature of the trade between 1957 and 1965. Following exports of 222,000 gallons in 1957, sales fell substantially in 1958 to 83,000 gallons. In that year, hurricane damage severely affected the output from Colima and exports fell again in 1959 to 73,000 gallons and to 20,000 gallons in 1960. In 1961 there was an improvement but this was not maintained in 1962 and it was 1963 before any marked upturn was recorded when 120,000 gallons were exported.

There was a fall to 93,000 gallons in 1964, mainly because of reduced exports to the USA which were not offset by the first substantial exports to the United Kingdom for five years, amounting to 43,000 gallons. In 1965, there was a considerable increase in exports to a total of 416,000 gallons of which 305,000 gallons were shipped to the United Kingdom and 110,000 gallons to France. Most of the lime juice is exported to the United States (which has long sustained the Mexican trade), with the United Kingdom, France and Germany appearing as occasional buyers. A very small proportion of Mexico's exports of lime juice is understood to consist of concentrated juice, but actual figures are not available.

Exports of lime oil from Mexico as shown in Tables 17 and 18 have shown a tendency to rise between 1957 and 1965. In the four years 1957 to 1960 exports of lime oil averaged 265,000 lb. annually compared with annual average

*Cold-pressed oil is that obtained when the pulp and juice have been reamed out of halves of the fruit, leaving only the skins in which the essential oil remains. The skins are submitted to a very high pressure (for example, between rollers or screw presses) so that the aqueous cell liquid and part of the essential oil are expressed. Supercentrifuging will then yield the 'cold-pressed' oil.

exports of 451,000 lb. in the following five years up to 1965, an increase of 70 per cent. As in the case of lime juice, exports of lime oil in 1965 were at the highest level reached during the period under review. Lime oil is exported in quantity to the USA and, to a far lesser degree, to the United Kingdom and Canada. For example, in 1965, 600,000 lb. of oil were sold to the USA compared with 23,000 lb. to the United Kingdom and 1,000 to Canada.

THE LIMES INDUSTRY IN GHANA

The Ghanaian industry has been set up by L. Rose & Co. Ltd., under Government auspices. The potential lime area in Ghana is reckoned to be about 128,000 acres but, at present, some 4,500 acres are under approximately 1 million budded/grafted and seedling plants and the annual average yield from mature, clean trees is about 165 lb. per tree — considerably less if the trees are disease infected⁽¹²⁾. Disease has reduced yields from time to time and led to reductions in exports but control measures are quickly taken by the Department of Agriculture and by the local representatives of L. Rose & Co. Ltd. A processing factory is in operation and is sited in an area in which the local farmers have planted trees supplied from nurseries, both private and belonging to the factory. Fruit is collected up to a 15-mile radius from the factory. The limes are not picked from the trees but are collected from the ground during the rainy seasons (February — April and July — November). This has the disadvantage of making the fruit dirty so that a thorough washing is needed before processing to remove dirt and fine grit. The fruit in the area appears to be consistent in size (10 or 12 to the lb.) and matures to a good yellow colour.

Exports of lime juice from Ghana have shown a generally increasing trend since 1957 when 224,000 gallons were exported. They rose to 945,000 gallons in 1962 but there was a set-back because of disease in the following two years to 766,000 gallons and 612,000 gallons in 1963 and 1964 respectively. In 1965, there was a marked surge in exports to over one million gallons, and, it was estimated that in 1967 production would reach 1¼ million gallons most of which would probably be exported. Because of the unique position of L. Rose & Co. Ltd. in Ghana it is inevitable that exports since 1961 have been consigned only to the United Kingdom. Details of lime juice exports are given in Table 19.

Figures for the export of lime oil are not available, but it is likely that, as with juice, most of the oil is shipped to the United Kingdom. In 1966, United Kingdom imports of the oil, which is obtained by distillation in the L. Rose factory, were about 28,000 lb., an increase of 5,000 lb. over the 1965 figures and of 7,000 lb. over the 1964 total. It was expected that this figure would increase again in 1967.

THE LIMES INDUSTRY IN THE GAMBIA⁽¹³⁾

This Institute is closely concerned with a pilot scheme to develop a lime-processing industry in the Gambia where there are, at present, two sites — one of 5 acres and the other of 10 acres — under 'Key' limes. In addition, 500 acres once used for poultry production could be brought into the scheme if the limes project justifies further development. Some of the lime trees on the 15 acres are in poor condition but indications are that there is a plentiful supply of limes elsewhere in the Gambia. However, with adequate fertilising, 70 tons a year is considered possible from the two sites. From Gambia as a whole it appears that at least 200 tons of fruit a year is likely at the price of 2d. per lb. instead of the originally anticipated quantity of 100 tons.

The pilot plant consists of a small roller-mill with granite rollers, six wooden vats each of 500 gallons, a stainless steel, 100-gallon, still and various other minor items of ancillary equipment. During the first season's working (September to November 1967) it became apparent that there was far more fruit available than had previously been supposed and so it has been considered advisable to purchase

a larger roller-mill with a capacity of 2 tons of fruit an hour which can, it would seem, operate economically running only 2 hours a day.

Yield estimates* are that 1 ton of limes will produce 100-120 gallons of pulp/juice. After settling and treatment, 7 to 8 drums x 45 gallons of racked juice should be yielded from one vat. The top and bottom pulps remaining in the vats are for combining and distilling and the yield of oil should be 20-25 lb. from 4 tons of limes. Export packing is, for juice, in 45- gallons, fusion coated, steel drums and, for oil, in 4-gallon, tin-plated drums.

The first season's output from the pilot plant was 2,193 gallons of juice and 115 lb. of oil. Contracts had previously been arranged to sell the juice at sh. 10s. per gallon c.i.f. and the oil at sh. 67s.6d. per lb. c.i.f.

LIMES INDUSTRY IN TANZANIA

A company has been formed to exploit lime production in southern Tanzania. A 200-acre nucleus estate is reported to be in course of development with lime trees planted 170 to the acre and expected to come into limited commercial production five years from planting.

Smallholders are being encouraged to plant lime trees and are given free seedlings from the nurseries of the Government and the nucleus estate.

Mature trees, six years of age in the Government station are giving 280 lb. of fresh fruit per tree per annum but calculation for future yields from both plantation and smallholders are based on only 84 lb. per tree per annum.

The price to be paid to the growers for fruit is EA sh. -/75 cents (say 9d.) per 28 lb. which may be raised to 1s. for 28 lb. at some unspecified future date.

A simple crushing mill has been installed which produces juice at about 90 gallons per 1 ton of firm fruit. The mill is paid sh. 3/50 per gallon for the juice ex-mill. Casking, transport and all charges to c.i.f. UK port add approximately a further sh. 3s. per gallon.

It is understood that a target of 1 million gallons of juice per annum was envisaged but it is now rumoured that Tanzania has embarked on a large lime planting programme that may lead to a surplus of lime products on the world markets in future years. At the time of writing factual details are not known.

No export figures are given by Tanzania for lime oil and juice exports are categorized under the heading of 'Juice of Fruit and Vegetables other than Passion Fruit, Pineapple and Tomato'. It is, therefore, impossible to single out lime juice but exports of juices in this residual category in the four years available 1964 to 1967 fell from 150 tons in 1964 to 92 tons and 76 tons in the following two years respectively, rising to 120 tons in 1967. In the same four years, exports to the UK were 34 tons, 28 tons, 20 tons and 34 tons respectively but how much of these quantities might be lime juice is impossible to say.

THE LIMES INDUSTRY IN THE UNITED STATES OF AMERICA

Nearly all US limes are grown in Florida and three-quarters of them are disposed of as fresh fruit. The fruit is a minor crop in terms of US citrus fruit production

*The yields of juice and oil obtained from processing one ton of limes in the Gambia are similar – though perhaps marginally better – to the yields obtained in Dominica.

which, in the 1965-66 season, totalled over 8½ million tons, of which limes accounted for some 17,000 tons or 0.2 per cent. The limes not sold as fresh fruit usually go for processing into limeade concentrate but the lime is generally regarded as a luxury fruit compared with oranges and lemons and the demand is dependent, to a large extent, on the weather. Heavy advertising and good marketing have created a demand for lemon products with which the smaller lime industry has not been able to compete. It has also been suggested⁽¹⁴⁾ that, for processing purposes, the Florida lime crop has a difficult harvesting season. The limes start coming into production in May, reach a peak during June and July and maintain a good level through October, after which there is a marked decline in volume. In general, growers find that the new crop of limes brings better prices when shipped as fresh fruit up to about the middle of July and processors get only the off-grade fruit until this date. Afterwards, the price of fresh fruit drops off and all grades of fruit then become available to the processors. However, since limeade is primarily a hot weather drink the wholesale demand for limeade ceases in early August since by the time the new concentrate reaches the customer the hot weather is over. Thus the concentrator must process in August, September and October and carry frozen stocks until the following spring.

A further reason can be put forward for the failure of the lime industry to show marked growth and that is the fact that only a very small part of the Florida lime groves are under West Indian limes, which give the brightest and most delicate flavour of lime juice. Consequently, demand for lime juice in the United States is satisfied mainly from Mexico and, following a determined sales campaign by L. Rose & Co. Ltd., from the United Kingdom.

The West Indian lime is confined mainly to the Florida Keys and to the southern tip of the mainland. Because of its sensitivity to climatic conditions, especially frost, the West Indian lime has been superseded in most commercial groves by the Persian lime.

Despite the poorer quality of the juice of the Persian lime there is nevertheless a considerable amount of fruit processed annually in the USA as the following table shows:

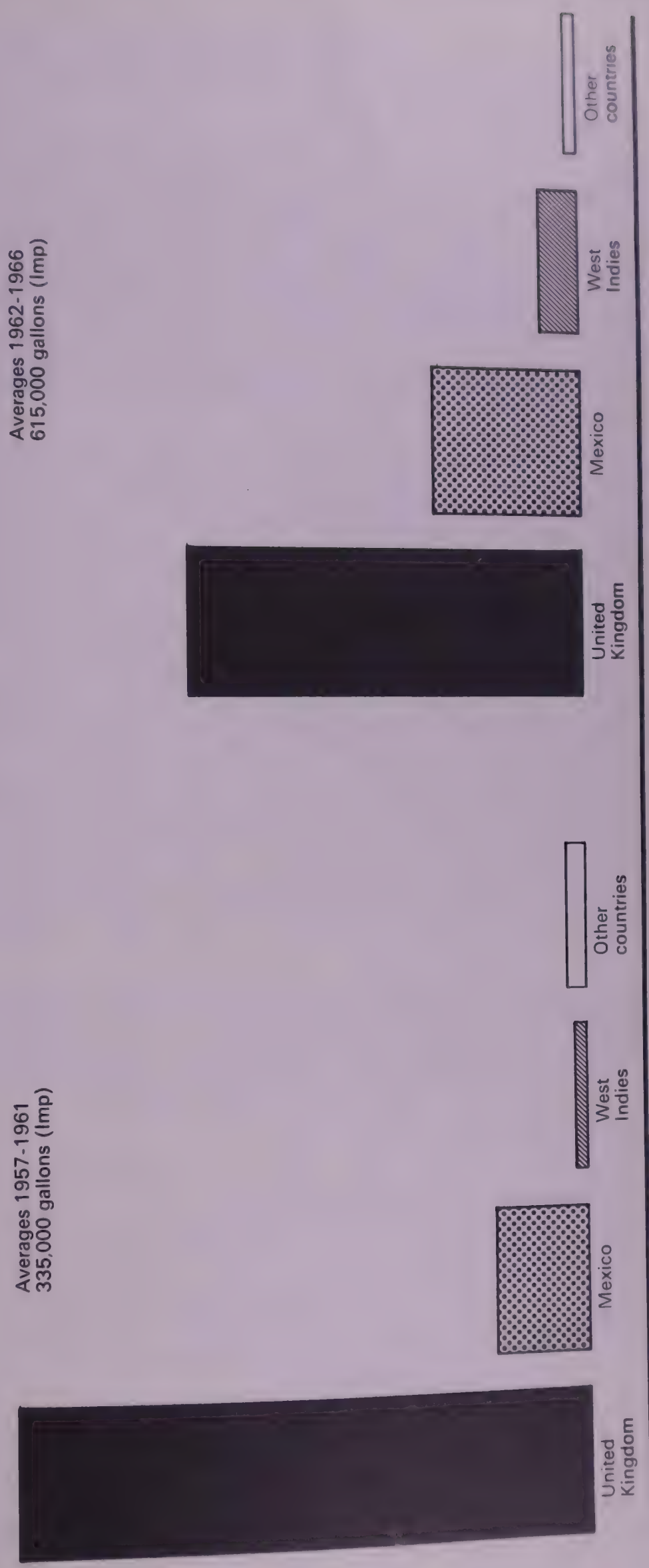
Table III

Limes: Sales in USA 1954-55 – 1964-65

	Total sales	Fresh sales	Sales to processors
1954-55	15,200	11,880	3,320
1955-56	16,000	12,000	4,000
1956-57	16,000	8,160	7,840
1957-58	14,000	11,040	2,960
1958-59	7,800	5,000	2,800
1959-60	12,600	7,960	4,640
1960-61	12,200	7,760	4,440
1961-62	13,400	7,320	6,080
1962-63	15,800	9,240	6,560
1963-64	17,800	9,280	8,250
1964-65	22,200	11,800	10,400

Source: "Citrus Fruits", *Statistical Bulletin No. 380 US Department of Agriculture. Crop Reporting Board, January 1967.*

Figure 1
Lime juice Imports into United States



Imports of juice increased so that although there seems to be a growing awareness of lime products in the United States, it appears that the juice from the imported West Indian lime is holding its position and, possibly, retarding the growth of the Florida limes industry.

Imports of lime juice are given in Tables 20 and 21. It will be seen that there has been a marked increase in imports of concentrated juice since 1960, with the United Kingdom and Mexico appearing as the usual suppliers. In 1962 and 1963, Mexico became the principal supplier, shipping 116,000 gallons and 212,000 gallons respectively. After 1963, the USA included imports of concentrated juice with those of unconcentrated. The UK is the largest exporter (shipping an annual average of 406,000 gallons between 1962 and 1965), followed by Mexico, and most of the imports from UK are likely to be of the clear, racked juice marketed through the L. Rose organisation. Imports have shown a propensity to rise in recent years probably because of the growing popularity of lime juice as a mixer in alcoholic drinks.

In Florida, the production of lime oil is a by-product of the extraction of the juice for canning. The most efficient of the plants aim at extracting the juice and the oil in one operation, but this produces an oil which is different in odour and flavour from the distillation process commonly used in the West Indies and Mexico whereby the oil is distilled from the hot, acid juice. In the modern process the oil can be separated without contact of juice and oil. It is claimed that this modern process produces a more natural lime flavour but that, nevertheless, the trade has become accustomed to the flavour of distilled lime oil and, so far, seems to prefer it to any other. This explains the high imports of lime oil entering the United States of America from Mexico and the West Indies, especially Haiti and, to a lesser degree, from the Dominican Republic, Jamaica and Trinidad. The largest supplier to the USA is Mexico, and average annual imports into the USA in the five years 1962 to 1966 were 495,000 lbs. compared with the annual average for the previous five years of 296,000 lbs; and in 1966 were recorded the highest imports from Mexico for the decade at 587,000 lbs. Haiti has also increased their exports to the USA, although the quantities are not on such a large scale as those sold by Mexico. In the five year period 1957 to 1961, average annual imports from Haiti were some 44,000 lb. whereas in the period 1962 to 1966 they had increased to 89,000 lb. The year 1966 was, as in the case of imports from Mexico, a record year and 104,000 lb. were purchased from Haiti.

Imports from the Dominican Republic are comparatively small and in recent years have been in the region of between 8,000 and 13,000 lb. Jamaica and Trinidad are small suppliers to the United States, shipping annually only a few thousand lb., except in 1966 when Jamaica sold 16,000 lb. Details of imports of lime oil into the United States of America are shown in Table 22.

THE PRICES OF LIME JUICE AND LIME OIL IN THE UK

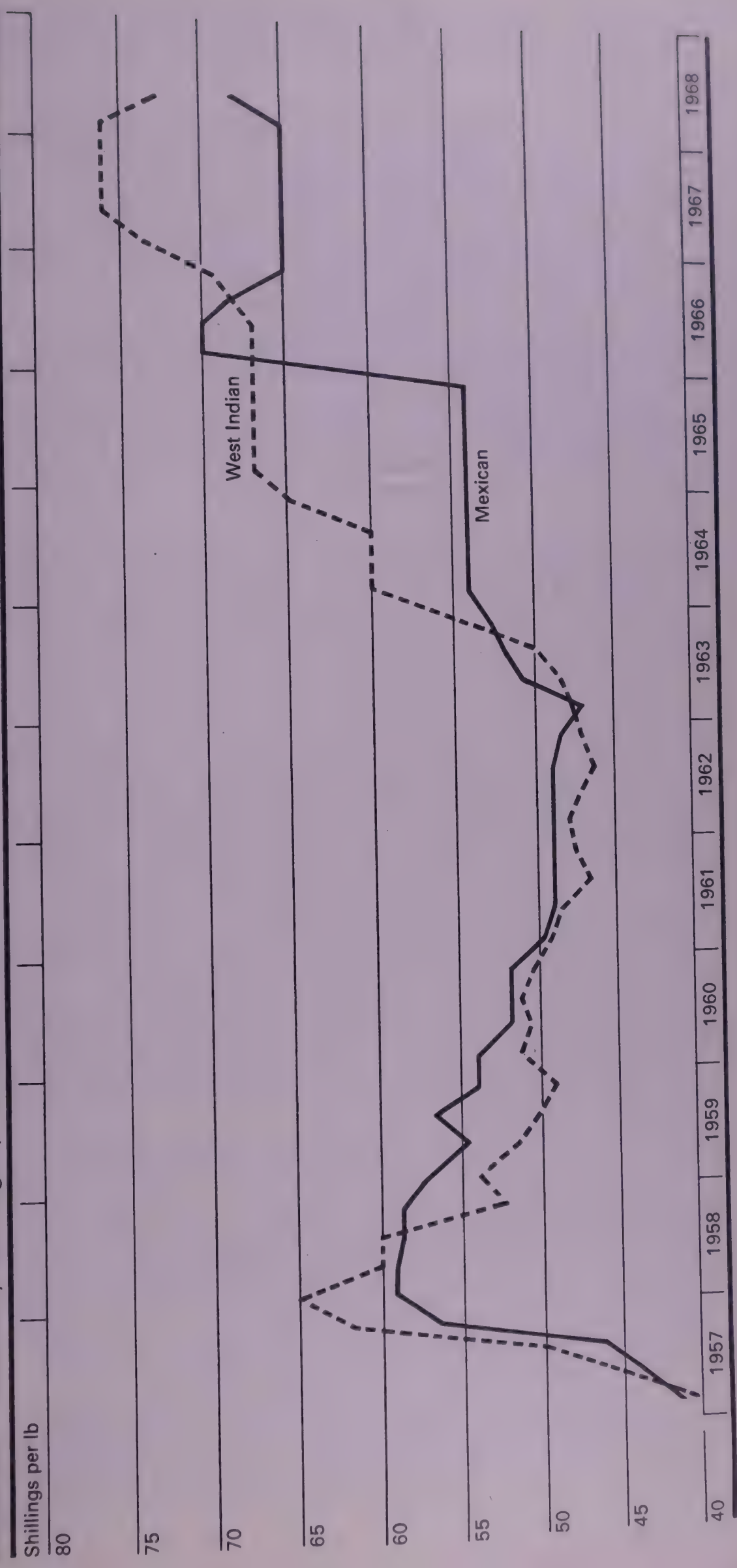
Unlike those for lime oil, the market prices for lime juice are not published on a regular basis and recourse to trade sources has been necessary. There is currently a surplus of lime juice but until recently there was a shortage and producers were being paid about double the price they would have accepted, say four years ago. For example, in 1963, one merchant was paying between 5s.6d. and 6s. per gallon for settled juice (maximum 2% pulp) c.i.f. London terms, whereas the price until recently was between 10s.6d. and 11s.6d. per gallon. It is now about 8s. per gallon.

In addition to the scarcity of the product, two other factors contributed to the increase in the price of lime juice namely, the high cost of barrels, which were in very short supply but are now more easily obtained, and increased freight.

At the prices of 10s.6d. to 11s.6d. per gallon the trade consider that lime juice is in danger of being priced out of the market. It is said that, in order to take

Figure 2
Lime oil Quarterly average prices, cif London

Source: Perfumery and Essential Oils Record



advantage of the greater interest in and demand for lime juice, a more realistic price would be 8s. to 8s.3d. per gallon c.i.f. which is the price to which juice has now fallen and this downward trend could continue if the coming season produces average crops.

Lime oil has also been in short supply, leading to an increase in the price. Quarterly average prices and the annual range from 1957 to 1966 in the UK market are given in Table 23. Prices here ranged from 60s. to 70s. per lb. c.i.f. and even the current price of about 60s. per lb. is regarded by the users as being too high and, here again, there is the possibility that the major users, (who are in the confectionery and soft drinks trade) will cease to use lime oil in their formulations, and will rely instead on lemon oil and sweet orange oil, which are now available at about 40s. to 45s. and 5s. per lb. respectively.

Lime juice imported into the UK from all countries, including EFTA but excluding Commonwealth countries, attracts an import duty of 18% *ad valorem* if there is more than 20% sweetening matter added. If the juice has less than 20/ sweetening matter the duty is 15% *ad valorem*. Lime oil is duty free from EFTA and Commonwealth sources but attracts a duty of 25% *ad valorem* from all other countries. Thus oil from Mexico bears the duty and therefore sells less competitively on the market than the West Indian oils.

There are no quantitative restrictions on imports of juice and oil nor are there any specific health regulations. However, there are health officials at all ports of entry into the UK authorized to inspect any goods entering the country to ensure they are fit for human consumption. High quality and standards must therefore be maintained. Standards are also laid down for the manufacture in the UK of ready-to-drink soft drinks containing fruit juice.

THE MARKET AND PROSPECTS FOR LIME JUICE AND LIME OIL IN THE UK

The United Kingdom market for citrus juices has grown during the years 1959 to 1965 from 16.6 million gallons in 1959 to 17.8 million gallons in 1965, an increase of 7.5 per cent. over the period of 1.07 per cent per year⁽¹⁵⁾. Imports of lime juice are not separately recorded in the UK trade returns but current UK demand for lime juice is estimated at between 1¾ million and 2 million gallons. Most of these supplies come from Commonwealth countries, particularly Ghana, Jamaica and Dominica. In this respect, the dominant position of L. Rose & Co. Ltd., has already been mentioned, both as plantation owners and as large importers and users. In 1965, Mexican lime juice was imported into the UK in a comparatively large quantity, 305,000 gallons compared with 43,000 gallons in the previous year and negligible quantities over the four previous years. This sudden rise in imports from Mexico can be attributed to a rise in the demand for lime juice and to the wish of importers and users to seek alternative sources of supply to the traditional West Indies markets.

In the past few years there has been considerably more interest shown in lime juice than ever before. This interest has been stimulated by the sales efforts of L. Rose & Co. Ltd., and there has been a diversification of consumer tastes from the traditional orange flavouring to the use of more lemon and lime flavourings. Another reason for the increase in lime juice consumption is the growing popularity of using lime juice as a mix with alcoholic beverages such as lager and vodka. It is estimated that the use of lime as a mix has created a demand for an extra ½ million gallons. However, the increase in demand is very much the result of public taste, which is notoriously fickle. For example, before World War II grapefruit juice achieved great popularity but now is an extremely poor seller.

In view of this, it is always possible that within the next few years the position could alter in favour of some juice other than lime. One of the factors that might curtail the demand is the high price. Soft drinks of the same general type, such as lime, orange, lemon, grapefruit, should ideally retail at the same price, but at

present lime juice is more expensive than orange and the purchase tax levied in the UK of 16½ per cent. *ad valorem* on soft drinks penalises lime juice still further.

Because of the high price some bottlers are marketing a product containing both lemon and lime juices, probably in equal parts or thereabouts. Should these become established in the popular taste the present demand for lime juice can be expected to decrease since it is unlikely that the rate of growth in the demand for soft drinks will offset this decrease in lime juice usage.

Imports of lime oil into the United Kingdom are shown in Table 24. Annual average imports of lime oil in the period 1962-66 amounted to 150,000 lb. compared with 100,000 lb. in the preceding five-year period, 1957-61. The highest recorded imports in the period under review were 201,000 lb. in 1966. Imports of lime oil in 1967 were 152,000 lb. The most consistent, and usually the largest, supplier of lime oil to the United Kingdom is Jamaica, whose annual exports have averaged 38,000 lb. over the decade 1957 to 1966. Ghana has become increasingly prominent since 1961 as a source of supply and the Windward Islands maintain a fairly consistent performance averaging, for 1957 to 1966, 25,000 lb. a year. United Kingdom firms generally prefer to deal in West Indian and Ghanaian oil.

Since 1965 the United States has figured more prominently as a source of supply and, in fact, in 1966, the USA was Britain's largest supplier sending 57,000 lb. This has probably been to make up for the shortage of lime oil from traditional sources experienced in the market during this time and occasioned by reserve stock buying in anticipation of the shortage.

Merchants' views differ on the quality of Mexican oil; some hold that it is similar in quality to the West Indian oil and, at the other extreme, others argue that the methods of expression used in Mexico give it some undesirable characteristics. Judgement of lime oil quality, as for most essential oils, is largely subjective and so the divergence in trade opinion is understandable. The duty of 25% *ad valorem*, together with the recent devaluation of sterling, combine to make Mexican oil expensive compared with the West Indian product and it seems likely that imports will be curtailed in the near future from the high levels of 24,000 lb. and 25,000 lb. recorded in 1965 and 1966.

The United Kingdom has a re-export trade in lime oil (Table 25 in the statistical appendix) which averaged 17,000 lb. per annum in the period 1962-66.

About 95 per cent of the lime oil imported into the United Kingdom is used as a flavouring for food and drinks. Its characteristic sharp, fresh taste makes it popular in sweets and it is added to lime squashes and cordials to give additional tang. No satisfactory substitute has been found for lime oil and although there are synthetics available they are of low quality compared with the natural oil. One of the major uses of lime oil is believed to be as part of the formula for 'cola' drinks but since these formulae are closely kept secrets, the quantities of lime oil used in this way cannot be ascertained.

It is estimated that the remaining 5 per cent of lime oil imports are used in cosmetics, especially mens' toiletries. This would appear to be a trade very much restricted by the dictates of fashion and conjecture as to the growth or otherwise of this sector of the market would be fruitless.

Subject to lime products not pricing themselves out of the market, the prospect for the next few years appears to be one of limited but sustained overall growth, largely in the soft drinks trade. It is difficult to estimate the rate of growth but it might be in the region of two to three per cent per annum. This estimate is based upon information supplied to TPI and could be confounded by supply difficulties, alterations in domestic taxation levels, failure of advertising campaigns or changes in public taste, or any combination of these factors.

THE MARKET AND PROSPECTS FOR LIME JUICE AND LIME OIL IN THE MAJOR MARKETS OF CONTINENTAL WESTERN EUROPE

Although there are no statistics available of imports of lime juice into European markets nor is it possible to calculate the level of imports from the export figures of the principal producing countries, there are nevertheless reasons for believing that continental western Europe may take increasing quantities of lime juice during the next few years. Rising personal incomes and generally higher standards of living tend to lift fruit juices out of the luxury class of foods, and dietary changes that include more fruit and vegetables in some meals, coupled with the greater availability of the domestic refrigerator, all help to favour higher consumption of citrus juices and there is no reason why lime juice should not have some share in this expansion, especially if it can be accepted as a drink suitable for preceding the consumption of food, like orange juice.

This does not mean that the European market offers easy entry to importers of lime juice. The trade in orange juice is well-established and is growing faster⁽¹⁵⁾ than that of grapefruit or lemon juice and all these have achieved greater acceptance so far than has lime juice.

Nevertheless, the firm of L. Rose & Co. Ltd., particularly, have been active in promoting sales of lime juice in some Continental markets.

The EEC countries are very difficult to break into because France, Italy and Belgium/Luxemburg will not permit the entry of juice preserved by chemical additives. This effectively excludes lime juice marketed by Rose's which has been preserved by SO₂. In the Federal Republic of Germany, all juices are subject to a quality control and the importer is responsible for ensuring that the required standards are met. These regulations as they apply to the various countries are dealt with in greater detail below.

The Scandinavian countries are the ones that have taken most readily to lime juice and the possibilities of developing these markets seem brighter than those of other Western European countries although it has been reported that the former have reached a peak of demand that will probably last for a few years before there is any further increase.

France, Belgium/Luxemburg, Italy

For the sake of good order it must be stated that, since Italy is itself a major supplier of citrus juices, there is no market in the country for the sale of lime juice or lime oil.

No statistics are available of imports of lime juice into France or Belgium/Luxemburg. L. Rose & Co. Ltd. inform us that it is not possible to produce a satisfactory lime juice cordial that complies with the local food regulations which, as far as these concern additives and preservatives, are based on the standards set out in the FAO *Codex Alimentarius*. In effect, this calls for preservation exclusively by physical means.

There are no entry control regulations for any of these countries but the juice must have undergone a pasteurisation process (high or low, depending on the importer) in the exporting country and the juice must be packed immediately afterwards in sealed cans.

The general rate of customs duty for these countries was, in May 1969, 18.6% *ad valorem*. If the lime juice contained more than 33% added sugar there was an additional levy in France of 17.65% on the duty paid value. If the juice contained 33% added sugar or less, no additional tax was levied. If the juice contained no sugar, there was a straight duty of 19%. In Belgium/Luxemburg, the additional levy on the duty paid value was 14% if the juice is packed in

containers of 3 kg or less, otherwise it was 7%.

No statistics are available on imports of oil of Lime. It is reported⁽¹⁶⁾ that the outlets in France are very limited, the oil being used only in aerated drinks which do not enjoy in France the same popularity as they do in England.

The general duty on lime oil (not terpeneless) in France and Belgium/Luxemburg is 11.06% *ad valorem* with an added value tax of 23.45% in the case of France and 7% in the case of Belgium/Luxemburg.

Germany and the Netherlands

Total sales in these two countries are very small. The flavour of lime is virtually unknown and it is considered that it will be a very long-term task to establish the sale of lime drinks in any quantity. Although the reports we have had from several contacts in these countries are generally of a discouraging nature, there are one or two merchants who think that the consumption of both oil and juice will increase in the course of the next few years. The general consensus of opinion is that lime juice and lime oil are used mainly in the Cola drinks and the two brand leaders in this field, Coca Cola and Pepsi Cola, obtain their raw material from the USA.

In the early part of 1969, offers of cold-pressed lime oil were being made at US \$9.95 per lb. and of distilled oil at US \$7.75 per lb., both prices net f.o.b. Mexico or Caribbean ports. At these prices business was, at that time, being concluded.

The general tariff for the German Federal Republic was, in May, 1969, 18.6% *ad valorem* if the juice contained 33% added sugar or less. If the sugar content was higher than 33% an additional levy of 11% on the duty paid value was payable. In the case of the Netherlands, the additional levy is 12 per cent.

The general tariff on a lime oil (not terpeneless) is 11.06% *ad valorem* with the additional levy of 11%, effectively reduced to 7% by reason of a refund allowable up to 31st March 1970. The additional tax is also 7% in the case of the Netherlands.

No quantitative restrictions are imposed but, according to German law, all juices are subject to quality control. The importer is responsible if the required standards are not met and so all shipments are examined by an accredited chemist, in the form of sample tests, on behalf of the importer.

Switzerland

Reports from Switzerland indicate that the Swiss consumer hardly knows the flavour of lime and it is only British and American tourists who ask for the juice. Exports from the United Kingdom of cordial are reported to be only a few hundred gallons a year.

There is a small trade in lime oil, mainly to the perfume and cosmetics trade. The firm of Givaudan S/A, the largest essential oil user in Switzerland, uses about 2,000 kg. a year. Another firm buys about 200-300 kg. a year of a special quality cold-pressed lime oil for which they were paying, in the early part of this year, US \$11.45 per lb. f.o.b. At the same time, distilled lime oil was US \$8.00 per lb. f.o.b.

The tariffs that follow are as at February 1968:

No. 20.07

General

Fruit juices, unsweetened

Other:

Neither frozen nor concentrated fr 28.00 per 100 kg

Frozen or concentrated fr 32.00 per 100 kg

Sweetened:

In glass bottles of 2 decilitres or less fr 30.00 per 100 kg

Other fr 70.00 per 100 kg

No. 33.01

Essential oils, citrus fruits fr 9.00 per 100 kg

There are no EFTA reductions.

Scandinavia

L. Rose & Co. Ltd. report that the total usage of lime juice in Scandinavia is, at present, about 160,000 gallons a year. In their opinion, the market has reached its peak and is not likely to show any increase for the next few years. Nevertheless, these countries, particularly Sweden and Denmark, have shown an interest in lime juice that has not been apparent in other parts of Europe and, for this reason alone, they should be viewed as potential markets by would-be suppliers.

Sweden

It has been reported by one firm in Sweden that the total market for lime juice in that country in 1968 was supposed to be about 1 million litres (say 220,000 gallons), all of which would be in carbonated form in bottles of 37 and 75 centilitres. This figure must be contrasted with the much smaller figure reported by L. Rose & Co. Ltd. Unfortunately, there are no published statistics and one has, perforce, to rely on trade estimates. In some cases, the bottles of juice are themselves imported and, in others, the juice is imported in bulk in barrels and bottled under licence.

The Swedish tariff as at January 1967 was:

Fruit juices (including grape and vegetable juices, must whether or not containing added sugar, but unfermented and not containing spirit)

Citrus fruit juices:

Unsweetened, in containers of a gross weight:	<i>Rate</i>	*
Exceeding 3 kg	15	
Not exceeding 3 kg	20(1)	
Sweetened	30(1)	

* In Swedish Crowns per 100 kgs net weight. No EFTA reductions.

(1) The duty is levied on the net weight of the goods, including the packagings in which such goods are usually sold by retail.

The Swedish market depends largely on the drinking habits of the population and these are generally sophisticated and subject to sudden changes. For instance, when vodka with lime was a popular drink in Sweden, sales of lime juice rocketed and were maintained at a high level for about three years. Then taste shifted to drinks not using lime juice and sales declined.

It is reported that Norway and Denmark follow Sweden in drinking habits.

The following was the Norwegian tariff as of 1st April, 1969:

Citrus fruit juices,

Containing added sugar,

Other than orange 3 Norwegian Kroner per kg

Not containing added sugar,

Other than orange 0.60 " " "

No EFTA reductions apply.

It must be noted that all processed fruit products are subject to strict quality control by the Norwegian Government and processors or their agents must submit samples of their products for examination by STATENS KVALITETS-KONTROL VEGETABILSKES KONSERVER, BREIGATEN 10, OSLO, NORWAY. Imports cannot pass through customs unless the laboratory's stamp of approval has been affixed to the invoice. This implies that samples have to be submitted and approved before actual import takes place.

There are no such regulations in Denmark other than the fact that the juice should be pasteurised before leaving the exporter. Large users might be expected to issue directions to exporters for specific processing requirements or for particular additives to be included.

The tariff rates for Denmark as at 1st April 1968 were:

Citrus juices:

Sweetened 14.4% ad. val. (No EFTA reduction)

Unsweetened Free

Enquiries about lime oil markets in the Scandinavian countries have proved fruitless. If any market does, in fact, exist it must be very small.

The following are the tariffs on lime oil as at 1st April, 1968:

Item 33.01 Essential Oils (terpeneless or not)

Sweden Free of duty — all countries

Denmark Free of duty — all countries

Norway 6.4 Norwegian Kroner per kg (No EFTA rebate)

THE WORLD PICTURE FOR LIME JUICE AND LIME OIL

It would appear that the proposed future production of lime juice will be more

than enough to meet the likely demand. It is difficult to arrive at a satisfactory estimate of production because of the lack of statistical data. The following projections have been made by Dr. Gordon K. Malipant, the Head of Citrus Research at the University of the West Indies, Trinidad, for production in Commonwealth Caribbean countries by 1971.

	<i>Tons</i>
Antigua	Nil
Br. Honduras	8
Dominica	5,100
Granada/Cariacou	1,400
Guyana	3,600
Montserrat	100
St. Kitts	Nil
St. Vincent	3,000
Trinidad/Tobago	2,000
	<hr/>
	15,208 Tons
	<hr/>

Projections for Jamaica, St. Lucia and Barbados are not available but production in Jamaica in 1965 was 14,300 tons and, in St. Lucia, 121 tons whilst Barbados production in 1966 was 34 tons. Even assuring that production in these three territories remains static at these levels, some 30,000 tons of limes will be produced by 1971. If it is further assumed that 1 ton of limes will give 75 gallons of settled juice, the production for this area will be about 2¼ million gallons. To this must be added African and Mexican production. Ghana can produce upwards of 1¼ million gallons, Nigeria about 15,000 gallons and if Tanzania's plans come to fruition there may be 1 million gallons to be added for that country, making a total of 3½ million gallons. Mexican exports in 1965 amounted to 416,000 gallons so that, at a conservative estimate, world production in 1971 can be considered to be about 4 million gallons of juice.

Estimates of future demand are, if anything, even more difficult to calculate. In 1965, UK imports of juice were of the order of 2 million gallons, those of the USA say, 650,000 gallons and Europe about 200,000 gallons. If we assume a rate of growth in demand of 3 per cent per annum, the total demand from these markets by 1971 will be about 3 million gallons. Thus, even on these rough estimates and bearing in mind local consumption there looks to be every possibility of a surplus of lime juice in the next year or two.

In the case of lime oil, the recorded imports in 1966 into the only two markets of any significance, namely the UK and the USA, were 201,000 lb. and 723,000 lb. respectively making a total of 924,000 lb. Against this Monsieur Cadillat of the Institut Francais de Recherches Fruitieres, Paris, has estimated⁽¹⁷⁾ world production at 550 metric tons (1,212,542 lb.) so production appears to be able to meet reasonable demands.

Assuming the continued overall growth of demand for lime products (there may be short-term variations), the decision of a developing country to enter the field of lime-growing and processing must be influenced by other factors. These are, chiefly, the degree of competition from other supplying countries and the overall position of supply in relation to demand. The number of areas at present going in for lime production has already been pointed out in this report and it is safe to say that, normal conditions prevailing, the supply of lime juice and lime oil is sufficient to meet all demands. Natural phenomena such as tree disease, hurricanes and other adverse climatic conditions can upset this balance but the current situation in for

example, the UK is that the market is being oversupplied and the prices of both juice and oil are depressed. This situation has arisen following good crops in the producing countries, a poor summer in the UK and over-buying by users.

There are, therefore, good reasons for treating with reserve the notion of limes being a crop with a good long-term prospect of profitability. Some of these reasons have been adduced above and another is the fact that it takes 8 to 10 years for lime trees to reach full bearing stage. Thus the decision to plant limes in any area where there are no existing trees should only be taken after the most exhaustive assessment of the issues involved.

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Table 1
Lime Juice, Settled
Exports from Dominica

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
Totals	326.1 75.0	582.5 186.5	(a) 727.1 243.8	(a) 443.0 177.3	(a) 89.0 22.3	19.4 6.2	20.6 6.3	152.9 44.2	291.2 85.2	177.6 66.5
Gals. '000 £ '000										
of which to:										
United Kingdom	268.3 60.2	477.2 149.6	614.5 203.7	...	...	0.6 0.2	— —	...	...	...
Gals. '000 £ '000										
Canada	9.1 2.1	20.1 7.7	21.6 8.3	...	...	6.9 2.1	8.8 2.4	...	...	...
Gals. '000 £ '000										
Other West Indies	9.3 2.3	19.2 6.3	18.4 6.1	...	...	1.3 0.4	— —	...	...	...
Gals. '000 £ '000										
United States	6.5 1.9	12.4 4.7	13.2 5.1	...	...	7.3 2.5	7.3 2.4	...	...	...
Gals. '000 £ '000										
Australia	22.5 5.0	39.3 12.9	...	...	...	— —	1.5 0.5	...	...	...
Gals. '000 £ '000										
Unspecified Countries	10.4 3.5	14.3 5.3	59.4 20.6	...	...	3.3 1.0	3.0 1.0	...	...	...
Gals. '000 £ '000										

... Separate figures not available

— Nil or negligible

(a) Includes all lime-juice

(b) Includes New Zealand

Source: *Annual Overseas Trade Report Treasury Department*

Table 2
Lime Juice, other than Settled
Exports from Dominica

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
<i>Top Pulp</i>										
Raw	Gals. '000 £ '000	123.0 37.9	144.0 57.3	(a) ...	(a) ...	87.1 31.3	2.4 0.8	26.6 7.8	103.6 28.7	35.0 12.2
Sweetened	Gals. '000 £ '000	— —	— —	... ...	... ...	3.0 0.9	1.8 0.6	0.2 —	9.0 0.3	14.8 0.6
Concentrated	Gals. '000 £ '000	— —	— —	... ...	... ...	25.4 9.6	22.7 9.9	18.0 8.3	— —	0.6 2.8
Totals	Gals. '000 £ '000	123.0 37.9	144.0 57.3	...	...	113.4 196.6	85.1 133.2	31.7 47.2	24.7 31.5	74.5 98.3
of which to:										
United Kingdom	Gals. '000 £ '000	121.0 36.9	137.0 54.0	...	...	200.7 228.0	85.1 133.2	...	...	...
South Africa	Gals. '000 £ '000	— —	— —	...	...	3.0 0.9	1.7 0.5	...	...	...
Canada	Gals. '000 £ '000	2.0 0.8	1.0 0.6	...	...	2.1 0.8	2.4 0.9	...	...	...
Other West Indies	Gals. '000 £ '000	— —	5.0 2.3	...	...	1.6 0.6	6.7 2.7	...	...	...
United States	Gals. '000 £ '000	— 0.2	1.0 0.4	...	...	21.5 8.1	16.1 7.2	...	...	...

... Separate figures not available

— Nil or negligible

(a) Included with main category

Source: *Annual Overseas Trade Report, Treasury Department*

Table 3
Lime Oil
Exports from Dominica

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
<i>Distilled</i>				(a)						
lb.'000	20	4343	20	27	33	32	35	17	23	33
£ '000	47.3	111.6	48.6	55.8	79.0	68.3	74.5	36.0	42.4	68.0
<i>Hand-pressed (ecuelled)</i>										
lb.'000	1	1	—	—	—	—	—	—	—	—
£ '000	3.9	2.9	—	—	—	0.1	0.4	—	0.4	—
<i>In solution</i>										
lb.'000	—	—	—	—	—	3	—	—	—	—
<i>Totals</i>										
lb.'000	21	44	20	27	33	35	35	17	23	33
£ '000	51.2	114.5	48.6	55.8	79.0	...	74.9	36.0	42.8	68.0
of which to:										
United Kingdom	13	38	16	...	...	29	32	...	...	...
£ '000	32.1	97.8	38.5	...	...	62.6	67.6	...	...	...
Australia	6	4	3	...	...	2	3	...	...	...
£ '000	13.8	11.3	8.3	...	...	3.7	7.3	...	...	...
Other countries	2	2	1	...	...	4	—	...	...	...
£ '000	5.3	5.4	1.8	...	...	...	—	...	...	...

... Separate figures not available
 — Nil or negligible
 (a) From Annual Reports of the Department of Agriculture
 Source: Annual Overseas Trade Report Treasury Department

Table 4
Lime Juice
Exports from Jamaica

	1957	1958	1959	1960	1961	1962	1963	1964	1965
<i>Totals</i>		(a)	(a)						(a)
Gals. '000	274	379	284	433	473	493	413	483	619
£ '000	72	109	65	117	125	126	102	130	196
of which to:									
United Kingdom	268	372	274	429	466	486	405	467	598
Canada	70	107	61	116	123	124	99	126	187
	5	...	...	2	5	3	1	2	...
United States	2	...	...	-	1	1	-	1	...
	-	...	...	2	2	4	3	3	...
Australia	-	...	...	1	1	1	1	1	...
	1	...	...	-	-	-	2	10	...
New Zealand	-	...	...	-	-	-	1	2	...
	-	...	...	-	-	-	2	1	...
Unspecified countries	-	...	...	-	-	-	1	-	...
	-	7	10	-	-	-	-	-	21
	-	2	4	-	-	-	-	-	9

... Separate figures not available

- Nil or negligible

(a) From December summaries

Source: *External Trade of Jamaica* The Department of Statistics

Table 5
Lime Oil
Exports from Jamaica

	1957	1958	1959	1960	1961	1962	1963	1964	1965
<i>Totals</i>	38 66	51 98	38 75	61 119	52 97	55 104	59 121	45 98	(a) 67 151
of which to:									
United Kingdom	32 53	45 86	29 54	60 117	52 96	51 96	56 113	42 91	67 151
Canada	4 6	— —	— —	1 2	— 1	1 1	1 3	2 4	— —
Australia	1 4	— —	7 16	— —	— —	3 7	1 3	1 3	— —
Other countries	1 3	6 12	2 5	— —	— —	— —	1 2	— —	— —

— Nil or negligible

(a) Provisional

Source: *External Trade of Jamaica* Department of Statistics

Table 6
Lime Juice, Raw
Exports from Grenada

	1957	1958	1959	1960	1961	1962	1963	1964	1965
<i>Totals</i>									
Gals. '000	3.2	38.5	32.0	76.0	41.9	12.2	2.2	—	3.0
£ '000	0.2	5.0	4.6	11.4	6.1	1.7	0.3	—	0.5
of which to:									
Dominica									
Gals. '000	3.2	38.5	32.0	48.8	40.4	—	—	—	—
£ '000	0.2	5.0	4.6	7.3	5.9	—	—	—	—
Trinidad									
	—	—	—	27.2	1.5	12.2	2.2	—	3
	—	—	—	4.1	0.2	1.7	0.3	—	0.5

— Nil or negligible
Source: *Annual Overseas Trade Report* Government Printer

Table 7
Lime Oil
Exports from Grenada

		1957	1958	1959	1960	1961	1962	1963	1964	1965
	lb. '000	1.4	1.7	0.1	—	1.2	0.8	2.7	2.5	(a) 5.6
	£ '000	2.7	4.3	0.2	—	2.6	1.6	6.3	6.3	15.3
<i>Totals</i>										
of which to:										
United Kingdom	lb. '000	1.2	1.6	—	—	0.7	0.8	2.7	2.5	2.0
	£ '000	2.5	4.1	—	—	1.7	1.6	6.3	6.3	6.2
Dominica	lb. '000	0.2	0.1	0.1	—	0.5	—	—	—	—
	£ '000	0.2	0.2	0.2	—	0.9	—	—	—	—
Unspecified countries	lb. '000	—	—	—	—	—	—	—	—	3.6
	£ '000	—	—	—	—	—	—	—	—	9.1

— Nil or negligible

(a) From December summary

Source: *Annual Overseas Trade Report Government Printers*

Table 8
Lime Juice
Exports from Guyana

	1957	1958	1959	1960	1961	1962	1963	1964
<i>Clear, filtered, etc.</i>								
Gals.'000	17.2	10.8	14.3	8.3	2.4	0.1	(a)	11.1
£ '000	4.1	3.2	3.9	2.4	0.7	0.2		2.8
<i>Raw</i>								
Gals.'000	—	0.1	0.9	0.1	—	0.2		—
£ '000	—	0.1	0.3	0.1	—	0.1		—
<i>Concentrated</i>								
Gals.'000	—	—	—	—	0.1	—		—
£ '000	—	—	—	—	—	—		—
<i>Totals</i>								
Gals.'000	17.2	10.9	15.2	8.4	2.5	0.3		11.1
£ '000	4.1	3.3	4.2	2.5	0.7	0.3		2.8
<i>of which to</i>								
United Kingdom								
Gals.'000	8.4	10.0	13.2	7.8	2.3	—		11.1
£ '000	2.0	2.9	3.5	2.3	0.7	—		2.7
Other West Indies								
Gals.'000	—	0.2	0.4	0.2	0.2	0.3		—
£ '000	—	0.1	0.1	0.1	—	0.3		0.1
United States								
Gals.'000	4.8	0.5	1.6	0.4	—	—		—
£ '000	1.2	0.2	0.5	0.1	—	—		—
New Zealand								
Gals.'000	4.0	0.2	—	—	—	—		—
£ '000	0.9	0.1	—	—	—	—		—

— Nil or negligible

(a) Figures not available

Source: External Trade Customs and Excise

Table 9
Lime Oil
Exports from Guyana

	1957	1958	1959	1960	1961	1962	1963	1964
<i>Distilled</i>								
lb.'000	0.3	1.4	0.7	0.8	0.3	0.3		5.6
£ '000	0.7	4.1	1.9	1.9	0.6	0.5		3.0
lb.'000	—	—	—	—	—	—		1.4
£ '000	—	—	—	—	—	—		0.5
<i>Hand-pressed (Ecuelled)</i>								
lb.'000	0.3	1.4	0.7	0.8	0.3	0.3		7.0
£ '000	0.7	4.1	1.9	1.9	0.6	0.5		3.5
<i>Totals</i>								
of which to:								
United Kingdom	—	1.2	0.5	0.8	0.3	0.3		6.4
Trinidad and Tobago	—	3.4	1.4	1.9	0.6	0.5		2.5
United States	—	—	—	—	—	—		0.4
New Zealand	—	—	—	—	—	—		0.8
	0.3	—	—	—	—	—		0.2
	0.7	—	—	—	—	—		0.2
	—	0.2	0.2	—	—	—		—
	—	0.7	0.5	—	—	—		—

— Nil or negligible

(a) No figures available

Source: *External Trade Customs and Excise*

Table 10
Lime Oil
Imports into Guyana

	1957	1958	1959	1960	1961	1962	1963	1964
<i>Distilled</i>								
	—	—	—	...	...	0.1	(a)	0.1
lb.'000	—	—	—	...	...	—	...	0.1
£ '000	0.3	0.1	0.6	0.4	1.3	1.9	...	0.1
lb.'000	0.8	0.3	2.3	1.5	2.8	4.0	...	1.9
£ '000							...	5.0
<i>Hand-pressed (ecuelled)</i>								
	0.3	0.1	0.6	0.4	1.3	2.0	...	2.0
lb.'000	0.8	0.3	2.3	1.5	2.8	4.0	...	5.1
£ '000								
<i>Totals</i>								
of which from:								
United Kingdom	—	—	0.6	—	—	—	...	0.1
Dominica	—	—	2.3	—	—	—	...	0.1
lb.'000	0.3	0.1	—	0.4	—	—	...	—
£ '000	0.8	0.3	—	1.5	0.1	—	...	—
lb.'000	—	—	—	—	—	0.1	...	0.1
£ '000	—	—	—	—	—	—	...	0.2
lb.'000	—	—	—	—	1.3	1.9	...	1.8
£ '000	—	—	—	—	2.7	4.0	...	4.8

... Separate figures not available

— Nil or negligible

(a) No figures available for 1963

Source: External Trade Department of Customs and Excise

Table 11
Lime Juice
Exports from Trinidad and Tobago

	1957	1958	1959	1960	1961	1962	1963	1964	1965
<i>Clarified, filtered</i>									
Gals. '000	61.2	60.7	51.5	201.0	26.1	90.9	74.6	84.1	46.8
£ '000	14.2	17.3	12.0	37.3	6.7	29.4	24.8	23.3	16.4
<i>Raw</i>									
Gals. '000	12.8	28.3	0.1	6.0	0.1	0.3	0.8	—	—
£ '000	4.8	11.1	—	1.7	—	0.1	0.3	—	—
<i>Concentrated</i>									
Gals. '000	0.1	0.1	0.1	0.3	0.1	—	0.2	—	—
£ '000	0.2	0.1	0.1	0.3	0.2	—	3.5	—	—
<i>Totals</i>									
Gals. '000	74.1	89.1	51.7	207.3	26.3	91.2	75.6	84.1	46.8
£ '000	19.2	28.5	12.1	39.3	6.9	29.5	28.6	23.3	16.4
of which to:									
United Kingdom									
Gals. '000	67.4	84.8	46.5	197.0	19.8	66.8	50.6	68.6	35.6
£ '000	16.6	26.6	10.6	36.3	4.5	16.4	15.1	18.2	12.1
South Africa									
Gals. '000	5.5	2.5	2.5	—	—	—	0.8	—	—
£ '000	2.2	0.9	0.6	—	—	—	0.3	—	—
Canada									
Gals. '000	—	1.6	—	6.0	0.1	3.1	9.5	6.7	5.7
£ '000	—	0.7	—	2.3	—	1.0	3.7	2.1	2.0
United States									
Gals. '000	—	—	2.1	—	6.3	20.7	14.5	8.8	5.5
£ '000	—	—	0.6	—	2.2	11.9	9.4	3.0	2.3
Other countries and ships' stores									
Gals. '000	1.2	0.2	0.6	1.3	0.1	0.6	0.2	—	—
£ '000	0.4	0.3	0.3	0.7	0.2	0.2	0.1	—	—

— Nil or negligible

Source: Overseas Trade Report Central Statistical Department

Table 12
Lime Oil
Exports from Trinidad and Tobago

	1957	1958	1959	1960	1961	1962	1963	1964	1965
<i>Distilled</i>									
lb.'000	6.6	7.7	4.0	12.2	11.7	22.0	5.4	34.4	8.8
£ '000	13.3	18.6	8.8	28.3	22.4	38.8	12.5	57.9	20.0
<i>Hand-pressed (ecuelled) (a)</i>									
lb.'000	—	—	—	—	—	0.5	—	0.6	—
£ '000	—	—	—	—	—	1.1	—	1.6	—
<i>Totals</i>									
lb.'000	6.6	7.7	4.0	12.2	11.7	22.5	5.4	35.0	8.8
£ '000	13.3	18.6	8.8	28.3	22.4	39.9	12.5	59.5	20.0
<i>of which to:</i>									
United Kingdom	5.9	2.4	1.1	4.5	7.5	1.6	1.2	1.5	4.2
Bermuda	12.0	5.5	2.0	10.4	14.1	3.6	2.8	4.4	11.9
	—	—	—	2.7	—	15.3	—	29.3	2.7
Canada	—	—	—	6.0	—	24.5	—	44.7	2.7
	—	4.4	1.6	2.1	3.9	4.9	3.8	2.7	1.9
Australia	—	10.6	3.9	5.1	7.8	10.1	8.5	7.1	5.4
	0.5	0.9	1.1	2.2	—	0.2	—	0.4	—
New Zealand	1.0	2.5	2.9	5.3	—	0.6	—	1.0	—
	0.2	—	0.2	0.7	0.3	0.3	0.3	1.1	—
Other countries	0.3	—	—	1.5	0.5	0.8	0.9	2.3	—
	—	—	—	—	—	0.2	0.1	—	—
	—	—	—	—	—	0.3	0.3	—	—

— Nil or negligible

(a) Excludes re-exports of hand-pressed

Source: Overseas Trade General Statistical Office

Table 13
Lime Juice Raw
Exports from Montserrat

	1957	1958	1959	1960	1961	1962	1963	1964
<i>Totals</i>								
Gals.'000	8.3	17.1	0.4	0.2	6.7	0.3	5.7	14.2
£ '000	1.9	3.8	0.1	—	2.1	0.2	2.4	4.1
United Kingdom	—	...	...	—	—	0.2	0.3	6.3
	—	...	...	—	—	0.1	0.1	1.7
Canada	4.5	...	...	—	6.7	—	—	7.5
	1.0	...	...	—	2.1	—	—	2.4
Other West Indies	—	...	...	0.2	—	0.1	5.4	0.4
	—	...	...	—	—	0.1	1.6	—
Australia	1.6	...	...	—	—	—	—	—
	0.4	...	...	—	—	—	—	—
New Zealand	2.2	...	...	—	—	—	—	—
	0.5	...	...	—	—	—	—	—
Unspecified countries	—	...	...	—	—	—	—	—
	—	...	...	—	—	—	0.7	—

— Nil or negligible

... Separate figures not available

Source: *Report on Imports and Exports* Trade Commission, Montserrat

Table 14
Lime Juice, Raw
Exports from St. Lucia

	1957	1958	1959	1960	1961	(a)
<i>Totals</i>						
Gals.'000	5.4	4.4	3.7	—	5.5	
£ '000	0.9	0.8	0.68	—	1.2	
of which to:						
United Kingdom						
Gals.'000	4.0	4.4	3.7	—	—	
£ '000	0.7	0.8	0.6	—	—	
Canada						
Gals.'000	1.4	—	—	—	—	
£ '000	0.2	—	—	—	—	
Trinidad						
Gals.'000	—	—	—	—	5.5	
£ '000	—	—	—	—	1.2	

— Nil or negligible

(a) No trade after 1961

Source: *Report on Imports and Exports Government Printer*

Table 15
Lime Oil, Hand-pressed (Ecuelled)
Exports from St. Vincent

	1959	1960	1961	1962	1963
<i>Totals</i>					
lb.'000	—	—	0.5	—	0.1
£ '000	0.1	—	0.1	—	0.1
of which to:					
United Kingdom					
lb.'000	—	—	0.5	—	0.1
£ '000	0.1	—	0.1	—	0.1

— Nil or negligible

Source: Trade Report Government Printing Office

Table 16
Lime Juice
Exports from Mexico

	1957	1958	1959	1960	1961	1962	1963	1964	1965
<i>Totals</i>	222 134	83 54	73 50	20 8	73 35	66 64	120 99	93 77	416 140
(a)									
Gals.'000									
£ '000									
of which to:									
France	31 6	— —	— —	— —	— —	— —	— —	— —	110 42
German Federal Republic	4 4	— —	— —	— —	— —	— —	— —	1 5	1 2
Italy	7 6	— —	— —	— —	— —	— —	— —	— —	— —
United Kingdom	76 57	48 39	47 36	— —	1 1	— —	— —	43 44	305 94
Canada	23 14	— —	— —	— —	— —	— —	— —	— —	— —
United States	79 46	35 15	26 14	20 8	72 34	66 64	119 98	49 28	— —
Other countries	2 1	— —	— —	— —	— —	— —	1 1	— —	— —
£ '000									

— Nil or negligible

(a) A factor of 0.207 Imp.gals. per keg, was assumed

Source: Comercio Exterior Direccion General de Estadistica

Table 17
Lime Oil, in Specified Containers
Exports from Mexico

	1957	1958	1959	1960	1961	1962	1963	1964	1965
<i>Totals</i>									
lb.'000	0.2	3.8	0.9	1.0	9.7	1.5	4.4	5.0	22.0
£ '000	0.2	2.2	0.9	1.0	11.5	1.6	31.0	56.5	74.0
of which to:									
France	—	—	—	—	—	—	0.7	0.4	3.4
£ '000	—	—	—	—	—	—	1.2	0.7	6.0
Netherlands	—	1.1	0.9	0.5	—	—	—	—	—
£ '000	—	1.1	0.9	0.5	—	—	—	—	—
United Kingdom	—	—	—	—	—	—	—	—	0.9
lb.'000	—	—	—	—	—	—	—	—	1.9
£ '000	—	—	—	—	—	—	—	—	—
Canada	—	—	—	—	—	1.3	—	—	—
lb.'000	—	—	—	—	—	1.4	—	—	—
£ '000	—	—	—	—	—	—	—	—	—
Chile	—	—	—	—	—	—	1.2	3.3	5.4
lb.'000	—	—	—	—	—	—	25.3	53.3	50.7
£ '000	—	—	—	—	—	—	—	—	—
El Salvador	—	1.9	—	—	—	—	—	—	—
lb.'000	—	—	0.6	—	—	—	—	—	—
£ '000	—	—	—	—	—	—	—	—	—
United States	—	0.5	—	0.4	9.7	—	2.3	0.9	12.3
lb.'000	—	0.5	—	0.5	11.5	—	4.3	1.9	15.3
£ '000	—	0.3	—	0.1	—	—	0.2	0.4	—
Other countries	0.2	—	—	—	—	0.2	0.2	0.6	0.1
£ '000	0.2	—	—	—	—	—	—	—	—

— Nil or negligible

Source: Comercio Exterior Direccion General de Estadistica

Table 18
Lime Oil, in Unspecified Containers
Exports from Mexico

	1957	1958	1959	1960	1961	1962	1963	1964	1965
<i>Totals</i>									
lb.'000	442	374	97	142	273	582	559	181	616
£ '000	410	440	115	164	301	802	957	379	1,326
of which to:									
United Kingdom									
lb.'000	27	31	4	10	16	15	14	9	22
£ '000	27	36	5	12	18	20	25	18	49
Canada									
lb.'000	1	3	—	2	1	—	3	6	1
£ '000	1	3	—	2	1	—	6	12	3
United States									
lb.'000	414	340	91	129	254	564	541	163	588
£ '000	382	400	107	149	280	777	923	342	1,264
Other countries									
lb.'000	—	—	2	1	2	3	1	3	5
£ '000	—	1	3	1	2	5	3	7	10

— Nil or negligible
Source: Comercio Exterior Direccion General de Estadística

Table 19
Lime Juice, Unfermented (a)
Exports from Ghana

	1957	1958	1959	1960	1961	1962	1963	1964	1965
<i>Totals</i>									
Gals.'000	224	230	692	799	871	945	766	612	1,076
£ '000	22	25	71	88	89	127	167	141	691
of which to:									
United Kingdom	221	211	675	779	871	945	766	612	1,076
	22	23	70	87	89	127	167	141	691
South Africa	—	19	17	20	—	—	—	—	—
	—	2	1	1	—	—	—	—	—
Other countries	31	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—

— Nil or negligible

(a) From 1961, includes other fruit juices, which are negligible in previous years

Source: *External Trade Office of the Government Statistician*

Table 20
Lime Juice, not Concentrated
Imports into United States

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
<i>Totals</i>	146 151	207 203	323 333	395 420	437 397	509 529	413 393	(a) 645 622	(a) 631 544	(a) 530 504
	(Imp.) Gals.'000 £ '000									
of which from:										
Italy	10 10	3 3	— —	— —	— —	2 —	7 9	1 1	1 1	1 1
United Kingdom	112 128	161 179	278 310	372 406	310 346	437 493	300 342	575 590	472 492	246 174
Canada	— —	— —	— —	— —	— —	— —	— —	— —	— —	38 51
Leeward and Windward Islands	— —	7 3	3 1	— —	— —	— —	— —	2 —	2 1	172 241
Mexico	15 8	32 16	32 18	20 12	116 44	56 22	99 35	61 24	155 49	64 26
Trinidad and Tobago	1 —	1 —	5 2	— —	10 7	14 12	5 4	— —	— —	6 8
Other countries	8 5	3 2	5 2	3 2	1 —	— 2	2 3	6 7	1 1	3 3
	Gals.'000 £ '000									

— Nil of negligible

(a) Includes concentrated

Source: Bureau of the Census Report FT 110 and FT 125 Department of Commerce

Table 21
Lime Juice, Concentrated
Imports into United States

	1957	1958	1959	1960	1961	1962	1963
<i>Totals</i>							
Gals.'000	36	8	6	91	25	124	223
£ '000	22	2	5	78	26	52	70
of which from:							
Italy	14	—	—	—	—	—	—
	16	—	—	—	—	—	—
United Kingdom	20	7	3	66	18	8	5
	5	2	3	73	22	10	6
Mexico	—	1	2	25	6	116	212
	—	—	1	5	3	42	62
Trinidad and Tobago	—	—	—	—	1	—	6
	—	—	—	—	1	—	2
Other countries	2	—	1	—	—	—	—
	1	—	1	—	—	—	—

— Nil or negligible

Note: After 1963 included with unconcentrated juice

Source: Bureau of the Census Report FT 110 and FT 125 Department of Commerce

Table 22
Lime Oil
Imports into United States

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
<i>Totals</i>	460 681	394 770	227 407	283 509	456 767	652 1,140	647 1,247	307 671	678 1,590	723 1,791
of which from:										
Cuba	5 7	7 12	16 25	19 30	— —	— —	— —	— —	— —	— —
Dominican Republic	3 4	5 7	9 15	8 12	12 18	8 13	9 16	8 16	13 27	12 26
Haiti	29 49	26 51	37 65	42 68	75 130	83 141	85 162	74 142	90 201	104 262
Jamaica	— —	— —	2 4	— —	— —	6 10	4 7	5 10	— 1	16 49
Mexico	421 619	354 696	163 298	177 324	367 615	543 950	543 1,047	213 479	570 1,353	587 1,440
Trinidad and Tobago	— —	— —	— —	14 29	— —	— —	1 2	2 6	3 3	1 2
Other countries	2 2	2 4	— —	23 46	2 4	12 26	5 13	5 18	2 5	3 12

— Nil of negligible

Source: Bureau of the Census Reports FT 110 and FT 125 U.S. Department of Commerce

Table 23
Lime Oil
Quarterly Average Prices, and Annual Range, c.i.f. London
shillings and pence per lb.

		I	II	III	IV	Annual Range	
						Low	High
West Indian	1957	40/2	45/-	50/-	62/4	36/6	65/-
	1958	65/-	60/-	60/-	52/10	50/-	65/-
	1959	54/-	51/4	50/-	49/4	46/-	54/-
	1960	51/4	50/8	51/-	50/6	48/-	54/-
	1961	49/6	48/6	46/8	47/8	45/-	50/6
	1962	48/-	47/4	46/4	47/-	45/-	48/-
	1963	47/8	48/4	50/-	53/4	47/-	56/-
	1964	60/-	60/-	60/-	64/8	60/-	68/-
	1965	67/-	67/-	67/-	67/-	66/-	68/-
	1966	67/-	67/-	67/8	69/4	66/-	70/-
	1967	73/4	76/-	76/-	76/-	70/-	76/-
	1968	76/-	72/6				
Mexican (duty-paid)	1957	40/10	44/-	46/8	56/2	38/6	58/-
	1958	59/4	59/4	59/-	59/-	58/-	60/-
	1959	57/-	54/8	56/8	54/-	50/-	58/-
	1960	54/-	52/-	52/-	52/-	52/-	54/-
	1961	49/8	49/-	49/-	49/-	48/-	52/-
	1962	49/-	49/-	49/-	48/4	45/-	49/-
	1963	47/-	50/4	52/-	52/8	47/-	54/-
	1964	54/-	54/-	54/-	54/-	54/-	54/-
	1965	54/-	54/-	54/-	54/-	54/-	54/-
	1966	70/-	70/-	68/4	65/-	65/-	70/-
	1967	65/-	65/-	65/-	65/-	65/-	65/-
	1968	65/-	68/-				

Source: *Perfumery and Essential Oil Record*

Table 24
Lime Oil
Imports into the United Kingdom

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
<i>Totals</i>	93 165	130 273	44 86	97 191	148 256	112 209	149 279	119 241	171 425	201 511	(a) 152 421
of which from:											
Ghana	— —	3 2	5 4	9 7	23 18	18 23	41 61	21 39	23 48	28 55	35 69
Jamaica	21 46	37 101	19 49	43 104	42 98	45 103	50 115	30 75	49 150	49 154	41 138
Mexico	31 51	22 46	2 5	7 14	16 29	12 23	14 29	5 10	24 59	25 69	16 44
United States	17 31	15 32	2 3	— —	27 48	5 10	3 8	16 38	40 105	57 155	14 39
Windward Islands	12 17	45 75	13 20	26 38	31 43	28 42	24 35	20 28	23 37	30 50	14 39
Other countries	12 20	8 17	3 5	12 28	9 20	4 8	17 31	27 51	12 25	12 28	32 92

— Nil of negligible

(a) Subject to amendment

Source: *The trade of the United Kingdom H.M. Customs and Excise*

Table 25
Lime Oil
Re-exports from the United Kingdom

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
<i>Totals</i>	11 26	15 41	13 35	14 38	12 29	12 28	13 32	18 46	16 46	24 73
									(a)	(a)
France	2 4	1 3	1 3	2 6	— —	— —	— —	— —	3 10	1 4
German Federal Republic	— —	— —	1 3	2 6	2 4	2 4	— —	— —	— —	— —
South Africa	1 2	3 8	2 5	2 6	1 2	3 6	— —	— —	4 13	2 7
United States	— —	— —	— —	— —	— —	— —	— —	— —	— —	16 47
Australia	1 4	5 13	4 9	4 10	3 6	— —	— —	6 16	4 11	— 1
New Zealand	1 3	2 5	1 3	1 3	— —	— —	— —	— —	2 5	3 8
Other countries	6 13	4 12	4 12	3 9	6 17	7 18	13 32	12 30	3 7	2 6

— Nil or negligible

(a) Subject to adjustment

Source: *The Trade of the United Kingdom H.M. Customs and Excise*

